

I CLAIM:

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1. A method of selecting an operating speed of a memory module interface in a computer system, said system comprising a central processing unit, a memory controller, and at least one memory module comprising a serial presence detect memory, said method comprising:  
5 counting the number of said memory modules;  
generating multiple clock frequencies to  
10 provide selectable operating speeds of said memory module interface; and  
selecting one of said operating speeds of said memory module interface in accordance with said counting.
  - 15 2. The method of claim 1 wherein said selecting comprises generating memory module interface signals comprising clock, address, and data signals at a frequency based on said memory module count.
  - 20 3. The method of claim 1 further comprising obtaining information from said serial presence detect memory that includes at least one characteristic of said memory module, wherein said selecting comprises selecting one of said operating speeds in accordance with one of said counting and said characteristic.
  - 25 4. The method of claim 3 wherein said characteristic comprises the number of components in each said memory module.

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10. The method of claim 9, wherein said characteristic comprises a type of said memory module.

11. A method of selecting an operating speed of a memory module interface in a computer system, said system comprising a central processing unit, a memory controller, and at least one memory module comprising a serial presence detect memory, said method comprising:

counting the number of said memory modules;

obtaining information from said serial presence detect memory that includes at least the

number of components in each said memory module; and

selecting said operating speed of said memory module interface in accordance with at least one of said counting and said obtaining information.

12. A method of selecting an operating speed of a memory module interface in a computer system, said system comprising a central processing unit, a memory controller, and at least one memory module comprising a serial presence detect memory, said method comprising:

counting the number of said memory

modules;

obtaining information from said serial presence detect memory that includes at least a speed grade of said memory module; and

selecting said operating speed of said

memory module interface in accordance with at least one of said counting and said obtaining information.

13. A computer system comprising:

a central processing unit;

a memory controller including a memory

module interface; and

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11. A method of selecting an operating speed of a memory module interface in a computer system, said system comprising a central processing unit, a memory controller, and at least one memory module comprising a serial presence detect memory, said method comprising:

at least one memory module including a serial presence detect memory; wherein said memory controller:

5 generates multiple clock frequencies;  
accesses said serial presence detect memory;

keeps a running tally of the number of said memory modules based on said accesses to said serial presence detect memory; and

10 selects one of said clock frequencies for driving said memory module interface based on at least a final tally of the number of said memory modules.

14. The computer system of claim 13 wherein  
15 said central processing unit is a microprocessor.

15. The computer system of claim 13 wherein said memory controller obtains information from said serial presence detect memory that includes at least one characteristic of each said memory module.

20 16. The computer system of claim 15 wherein said characteristic comprises the number of components in each said memory module.

17. The computer system of claim 15 wherein  
25 said characteristic comprises a speed grade of said memory module.

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18. The computer system of claim 15 wherein said characteristic comprises a manufacturer of said memory module.

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19. The computer system of claim 15 wherein  
5 said characteristic comprises a type of said memory module.

20. The computer system of claim 15 wherein said characteristic comprises a physical layout of signal connections between said memory controller and  
10 said memory module.

21. A computer system comprising:  
a central processing unit;  
a memory controller including a memory module interface;  
15 at least one memory module including a serial presence detect memory; wherein said memory controller:  
accesses said serial presence detect memory;  
20 keeps a running tally of the number of said memory modules based on said accesses to said serial presence detect memory;  
obtains information from said serial presence detect memory that includes at least one  
25 characteristic of said memory module; and  
provides a memory module interface at a clock rate based on at least one of a final tally of the number of said memory modules and said obtained information.

22. The computer system of claim 21 wherein said characteristic comprises the number of components in each said memory module.

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5 23. A computer system comprising:  
a central processing unit;  
a memory controller including a memory module interface;  
at least one memory module including a serial presence detect memory, wherein said memory controller:  
10 accesses said serial presence detect memory;  
keeps a running tally of the number of said memory modules based on said accesses to said serial presence detect memory;  
15 obtains information from said serial presence detect memory that includes at least the number of components in each memory module; and  
provides a memory module interface at a  
20 clock rate based on at least one of a final tally of the number of said memory modules and said obtained information.

25 24. A computer system comprising:  
a central processing unit;  
a memory controller including a memory module interface;  
at least one memory module including a serial presence detect memory; wherein said memory controller:

accesses said serial presence detect  
memory;

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5 keeps a running tally of the number of  
said memory modules based on said accesses to said  
serial presence detect memory;

obtains information from said serial  
presence detect memory that includes at least a speed  
grade of said memory modules or their components; and  
provides a memory module interface at a  
10 clock rate based on at least one of a final tally of  
the number of said memory modules and said obtained  
information.

25. A computer system comprising:  
a central processing unit;  
15 at least one memory module including a  
serial presence detect memory; and  
memory controller means including  
memory module interface means; wherein said memory  
controller means:  
20 generates multiple clock frequencies;  
accesses serial presence detect memory;  
keeps a running tally of the number of  
said memory modules based on said accesses to said  
serial presence detect memory; and  
25 selects one of said clock frequencies  
for driving said memory module interface means at a  
clock rate based on at least a final tally of the  
number of said memory modules.

30 26. A computer system comprising:  
a central processing unit;

at least one memory module including a  
serial presence detect memory; and

memory controller means including  
memory module interface means; wherein said memory  
5 controller means:

accesses serial presence detect memory;  
keeps a running tally of the number of  
said memory modules based on said accesses to said  
serial presence detect memory;

10 obtains information from said serial  
presence detect memory that includes at least one  
characteristic of said memory module; and

provides a memory module interface means  
at a clock rate based on at least one of a final tally  
15 of the number of said memory modules and said obtained  
information.

27. The computer system of claim 26 wherein  
said characteristic comprises a type of said memory  
module means.

20 28. The computer system of claim 26 wherein  
said characteristic comprises a physical layout of  
signal connections between said memory controller means  
and said memory module means.

25 29. A computer system comprising:  
a central processing unit;  
at least one memory module including a  
serial presence detect memory; and

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memory controller means including  
memory module interface means; wherein said memory  
controller means:

5                   accesses serial presence detect memory;  
                  keeps a running tally of the number of  
said memory modules based on said accesses to said  
serial presence detect memory;

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10                   obtains information from said serial  
                  presence detect memory that includes at least the  
number of components in each memory module means; and  
                  provides a memory module interface means  
at a clock rate based on at least one of a final tally  
of the number of said memory modules and said obtained  
information.

15                   30. A computer system comprising:  
                  a central processing unit;  
                  at least one memory module including a  
serial presence detect memory; and

                  memory controller means including  
20   memory module interface means; wherein said memory  
controller means:

                  accesses serial presence detect memory;  
                  keeps a running tally of the number of  
said memory modules based on said accesses to said  
25   serial presence detect memory;

                  obtains information from said serial  
presence detect memory that includes at least a speed  
grade of said memory module or its components; and  
                  provides a memory module interface means  
30   at a clock rate based on at least one of a final tally

of the number of said memory modules and said obtained information.

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31. A memory controller comprising a memory module interface to at least one memory module, said  
5 memory module including serial presence detect memory; wherein said memory controller:

accesses serial presence detect memory;  
keeps a running tally of the number of  
said memory modules based on said accesses to said  
10 serial presence detect memory; and  
provides a memory module interface at a clock rate based on at least at least a final tally of the number of said memory modules.

32. The memory controller of claim 31  
15 wherein said memory controller obtains information from said serial presence detect memory that includes at least one characteristic of said memory module wherein said clock rate is also based on said characteristic.

33. The memory controller of claim 31  
20 wherein said characteristic comprises the number of components of said memory module.

34. The memory controller of claim 31  
wherein said characteristic comprises a speed grade of said memory module.

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35. The memory controller of claim 31 wherein said characteristic comprises a manufacturer of said memory module.

36. The memory controller of claim 31 wherein said characteristic comprises a type of said memory module.

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37. The memory controller of claim 31 wherein said characteristic comprises a physical layout of signal connections between said memory controller and said memory module.

38. A memory controller comprising a memory module interface to at least one memory module, said memory module including serial presence detect memory; wherein said memory controller:  
generates multiple clock frequencies;  
accesses serial presence detect memory;  
keeps a running tally of the number of said memory modules based on said accesses to said serial presence detect memory;  
obtains information from said serial presence detect memory that includes at least one characteristic of said memory module; and  
selects one of said clock frequencies for driving said memory module interface based on at least one of a final tally of the number of said memory modules and said obtained information.

39. The memory controller of claim 38 wherein said characteristic comprises a speed grade of said memory module.

40. A memory controller comprising a memory module interface to at least one memory module, said

accesses serial presence detect memory;  
obtains information from said serial

provides a memory module interface at a clock rate based on said obtained information.

accesses serial presence detect memory;  
generates multiple clock frequencies;  
obtains information from said serial  
presence detect memory; and

selects one of said clock frequencies  
for driving said memory module interface based on said  
obtained information.

42. The memory controller of claim 41 wherein said obtained information comprises a speed grade of said memory module.

43. Apparatus for selecting an operating speed of a memory module interface in a computer system, said system comprising a central processing unit, a memory controller, and at least one memory module comprising a serial presence detect memory, said apparatus comprising:

means for counting the number of said memory modules;

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5 means for generating multiple clock frequencies to provide selectable operating speeds of said memory interface; and

means for selecting one of said multiple clock frequencies to provide an operating speed in accordance with said counted memory modules.

44. The apparatus of claim 43 wherein said  
10 selecting comprises means for generating memory module interface signals comprising clock, address, and data signals at a frequency based on said memory module count.

45. The apparatus of claim 43 further  
15 comprising means for obtaining information from said serial presence detect memory, said information including at least one characteristic of said memory module; wherein said means for selecting selects one of said multiple clock frequencies in accordance with at  
20 least one of said number of counted memory modules and said obtained information

46. The apparatus of claim 43 wherein said  
characteristic comprises the number of components in  
25 each said memory module.

47. The apparatus of claim 43 wherein said  
characteristic comprises a speed grade of said memory module.

48. The apparatus of claim 43 wherein said characteristic comprises a manufacturer of said memory module.

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49. The apparatus of claim 43 wherein said  
5 characteristic comprises a type of said memory module.

50. The apparatus of claim 43 wherein said characteristic comprises a physical layout of signal connections between said memory controller and said memory module.

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51. Apparatus for selecting an operating speed of a memory module interface in a computer system, said system comprising a central processing unit, a memory controller, and at least one memory  
15 module comprising a serial presence detect memory, said apparatus comprising:

means for counting the number of said memory modules;

means for obtaining information from  
20 said serial presence detect memory that includes at least one characteristic of said memory module; and

means for selecting said operating speed of said memory module interface in accordance with at least one of said means for counting and obtaining  
25 information.

52. Apparatus for selecting an operating speed of a memory module interface in a computer system, said system comprising a central processing unit, a memory controller, and at least one memory

module comprising a serial presence detect memory, said apparatus comprising:

means for counting the number of said memory modules;

means for obtaining information from said serial presence detect memory that includes at least the number of components in each said memory module; and

means for selecting said operating speed of said memory module interface in accordance with at least one of said means for counting and obtaining information.

53. Apparatus for selecting an operating speed of a memory module interface in a computer system, said system comprising a central processing unit, and a memory controller, and at least one memory module comprising a serial presence detect memory, said apparatus comprising:

means for counting the number of said memory modules;

means for obtaining information from said serial presence detect memory that includes at least a speed grade of said memory module; and

means for selecting said operating speed of said memory module interface in accordance with at least one of said means for counting and obtaining information.

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